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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,052	03/22/2004	Hajime Shirakawa	P/1596-74	2685
2352	7590	04/07/2006	EXAMINER	
OSTROLENK FABER GERB & SOFFEN 1180 AVENUE OF THE AMERICAS NEW YORK, NY 100368403			ALANKO, ANITA KAREN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 04/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/807,052

Applicant(s)

SHIRAKAWA ET AL.

Examiner

Anita K. Alanko

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 1/9/06 amdt.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 11-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term “calculating device” is unclear. Should this refer to the “computing device” or the “calculating device”? It is unclear if the “etching rate” and “current etching rate” are the same or different from the “treating rate” and “current treating rate” cited in the base claims.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shekel, Hartman and Thompson (WO 2003/027647 A1) in view of JP 2001-189297 and Phan et al (US 6,808,591 B1).

Shekel discloses an apparatus comprising:

a treating tank for immersing the substrates in a treating liquid stored therein (page 25, lines 32-33);

a holding arm for holding the substrates (robotics, page 26, lines 10-11), said holding arm being movable to a treating position in said treating tank for immersing the substrates in the treating liquid;

a storage device 130 (Fig.3A) which stores

(a) a relationship between use history, treating rate of the treating liquid (page 31, lines 25-26; page 32, line 4 – the relationship is the “connection” between the etch rate and spectra), and

(b) an up-to-date use history of the treating liquid (inherent since have real-time control, and multiple ages of baths are accounted for and used in the model, for example processed wafer history includes bath history, page 35, lines 3-4); and

a calculating device which derives a current treating rate from (a) and (b) (Fig.3B, step 340; see also page 23, lines 4-6: Shekel discloses to determine an etch rate of a substance based

on the disappearance or appearance of the chemical (page 23, lines 4-6), which encompasses calculating a current treating rate.).

Shekel does not explicitly disclose that the holding arm is for holding the substrates in vertical posture. JP 2001-189297 teaches that holding substrate in vertical posture is a useful configuration (Fig.4, 7). It would have been obvious to one with ordinary skill in the art have the holding arm for holding the substrates in vertical posture in the apparatus of Shekel because JP 2001-189297 teaches that this is a useful way hold substrates when immersing in treatment baths.

Shekel does not disclose computing means for determining a corrected treating time by extending a predetermined treating time according to said current treating. Rather, Shekel uses the current treating rate to control the apparatus so that the treating rate stays within a predetermined range (page 40, lines 6-13).

Phan teaches that it is useful to control the amount of overtreatment (overetch) by using feedback data of etch rate (col.5, lines 22-27). Phan teaches that based on the etch rate (the current treating rate), that an estimated overetch time is determined. Phan teaches to use an overetch time controller (col. 11, line 41). Thus, Phan teaches to use a computing device which uses a current treating rate (etch rate) to determine a corrected treating time (the estimated overetch time).

Phan teaches a computing device to determine the corrected treating time (the overetch time, column 4, lines 34-35 since "adjustment" includes extending the treatment time) according to said current treating (the current etch rate). Phan does not explicitly disclose to extend the time, however there are only two options, either to correct by shortening or by extending the

treating time. Shekel teaches that it is well known that etch baths age as by-products of the normal processing accumulate in the bath (page 31, lines 6-9). To extend it would have been obvious to one with skill in the art because it is well known that etch bath aging occurs as taught by Shekel, and to get the desired etch properties requires modifying the etch time, for example extending, in order to achieve the same result compared to non-aged etch baths.

It would have been obvious to have a computing means for determining a corrected treating time by extending a predetermined treating time according to said current treating in the apparatus of Shekel and to treat the substrate for that corrected treating time because Phan teaches that this is useful to do improve control of treatment (etching) processes.

In addition, as to the wherein clauses of claims 12-20, the apparatus of Shekel is capable of performing these functions and therefore these functions do not patentably distinguish the claimed invention.

As to claims 12-13, the apparatus of Shekel takes into account, at least, the treated number of substrates and type of substrates (page 33, lines 26-27).

As to claims 14-16, the modified apparatus of Shekel does not disclose the specific equation cited, however it would have been obvious to one with ordinary skill in the art to derive the corrected treatment time from the equation cited since the models take into account aged baths, non-aged/fresh baths, and etch rates from aged and non-aged baths in order to determine the best overtreatment time for the specific product being etched.

As to claims 17-20, Shekel discloses hydrofluoric acid (page 31, line 29), however the bath is capable of holding phosphoric acid.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shekel, Hartman and Thompson (WO 2003/027647 A1), in view of JP 2001-189297, Phan et al (US 6,808,591 B1) and Schnegg (US 4,971,654).

As to claims 17-21, Shekel discloses hydrofluoric acid (page 31, line 29), however the bath is capable of holding phosphoric acid. Schnegg teaches that phosphoric and hydrofluoric acids are useful acids for etching substrates (col.8, lines 21-26). It would have been obvious to one with ordinary skill in the art to have a treating liquid which comprises phosphoric acid and hydrofluoric acid in the apparatus of Shekel because Schnegg teaches that they are useful etchants for substrates.

#### ***Response to Amendment***

The objection to the claim is withdrawn in view of the claim amendments. The claims remain rejected over Shekel, with additional references applied to teach the new claim limitation of vertical posture (JP 2001-189297) and phosphoric acid etchant (Schnegg).

Claims 14-16 are rejected under 35 U.S.C. 112, second paragraph.

Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shekel, Hartman and Thompson (WO 2003/027647 A1) in view of JP 2001-189297 and Phan et al (US 6,808,591 B1).

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shekel, Hartman and Thompson (WO 2003/027647 A1) in view of JP 2001-189297, Phan et al (US 6,808,591 B1) and Schnegg (US 4,971,654).

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***Response to Arguments***

Applicant's arguments filed 1/9/06 have been fully considered but they are not persuasive. Applicant argues that "Shekel appears to disclose a chemical etching apparatus that stores a history of use time of a treating liquid, adjusts the concentration of the treating liquid, and fixes an etching rate". Examiner acknowledges this, however Shekel also clearly discloses in the first paragraph of the detailed description of the invention that:

"...The analysis includes ....determining ...an etch rate of a substance based on the disappearance or appearance of the chemical."

The disappearance or appearance of the chemical encompasses the use history and up-to-date use history, as broadly cited.

Phan teaches that once this current etch rate is known, that it is useful to determine a correct overetch time. It is obvious to modify Shekel by Phan because Phan teaches that it is useful to correct overetch times.

The claims, as broadly cited, can include an apparatus that has both adjusting etch bath concentration as disclosed by Shekel, in combination with controlling the overetch time, as taught as useful to do by Phan.

Applicant argues that "Phan et al. appears to discloses a technique of controlling over-etching by changing etching time based on feedback data such as of an etching rate received from a multiple beam sensor (63) during treatment, and three-dimensional data provided by a process engineer." In response, Phan uses a broad model to determine the etch rate, however that is of no import since the primary reference already teaches how to determine the etch rate.



Phan is applied to teach what to do once the etch rate is known, namely that the overetch time can be corrected and extended.

Applicant argues that Shekel is basically different from the present invention because of the adjusting of concentration of the treating liquid. This argument is not commensurate in scope with the claim language because the apparatus is not limited to changing/not changing the concentration of the treating liquid.

Applicant argues that Phan does not disclose the storage device with the relationship between use history, treating rate and up-to-date use history. In response, the primary reference is relied upon to teach this feature. However, Phan does disclose to use libraries (col.6, line 9), which encompass these features.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Anita K Alanko

Primary Examiner

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